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# East Europe Report

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## EAST EUROPE REPORT SCIENTIFIC AFFAIRS

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REPORTS ON INTERNATIONAL CONFERENCES OF PHYSICISTS

Space Physics Task Force

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1982  
pp 87-88

[Article by El. Balevska: "16th Conference of Standing Space Physics Task Force"]

[Text] From 21 to 26 June 1982 the regular 16th Conference of the Standing Space Physics Task Force was held in Plovdiv at the Scientists Center. This is the only annual forum of leading specialists from the nine socialist countries cooperating in space research and utilization under the Interkosmos Program, in which year-round activity is reported in nine sections and new plans and experiments are projected.

Participating in this year's conference were delegations from the Bulgarian People's Republic, the Hungarian People's Republic, the Socialist Republic of Vietnam, the GDR, the Republic of Cuba, the Mongolian People's Republic, the Polish People's Republic, the Socialist Republic of Romania, the USSR and the Czechoslovak Socialist Republic. Among the foreign scientists taking part in the conference were such famous specialists in space physics as Prof V. Balebanov (USSR), Dr P. (Trizhka) (Czechoslovakia), Dr P. (Benize) (Hungary), Prof Dr Grzendelski (Poland) et al.

The conference officially opened on 21 June in the large conference room of the Scientists Center in Plovdiv with a brief address by Corresponding Member K. Serafimov, chairman of the National Committee for Research and Utilization of Outer Space and director of the Central Space Research Laboratory. He greeted the conference participants and extended wishes for their fruitful proceedings. Elected chairman of the Standing Space Physics Task Force for the next period was Prof M. Hajduk of the Czechoslovak Academy of Sciences, which will host the next (17th) Task Force Conference.

The proceedings of the conference took place in nine sections: upper atmosphere and magnetosphere; interplanetary plasma and solar wind; the sun and extra-atmospheric astronomy; cosmic rays; the moon, comets and hard component; research by satellite observations; space instrument manufacture; telemetry and electronics; space data transfer and processing; space technology.

For the first time this year the conference was conducted according to a new system: on 20, 21, 22 and 23 June parallel intersection working sessions were held, at which problems relative to current multifaceted space projects were preliminarily discussed. Thus, the Interbol Project (including the participation of Western European specialists in space physics and space instrument manufacture), which will be implemented in 1986-1987, aims at the investigation of extremely interesting phenomena in the "tail" of the earth's magnetosphere and the connection between ionospheric and magnetospheric processes, as well as the phenomena of "northern" lights, red rainbows etc. Another interesting space project (from the standpoint of world science as well) is the so-called VEGA (Venus-Halley) Project.

During the sessions of all sections not only the present activity of the individual sections, but also impending tasks were reported on and discussed.

Bulgarian science in the person of its sole and basically specialized scientific body for space research--the Central Space Research Laboratory of the Bulgarian Academy of Sciences--was widely represented in sessions of all space projects and assumed new obligations regarding the most urgent future space research.

In conclusion we should note that the 16th Conference of the Standing Space Physics Task Force was conducted in a spirit of completely mutual understanding and in a warm, friendly and scientific atmosphere.

#### Physics, Astrophysics Symposium

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 5, 1982  
pp 88-89

[Article by Senior Science Associate Dr Bogomil Kovachev: "International Symposium on General Basic Problems in Physics and Astrophysics (on the Occasion of the Formal Celebration of the 150th Anniversary of the Berlin Observatory)"]

[Text] Celebration of the anniversary of the Berlin Observation with this always timely topic was organized by the Central Astrophysics Institute of the GDR Academy of Sciences from 21 to 24 June in Potsdam.

The principal papers of the session were delivered in the castle theater at the new palace of Sans Souci. On the second day the proceedings continued in the observatory auditorial in Babelsberg under the cupola of the impressive (for its size) 65-centimeter Zeiss refractor. A creative discussion also took place at the Einstein villa in Kaputt (7 kilometers from Potsdam), now presented as a gift to the GDR Academy of Sciences by his heirs.

Among the participants at the gala session, opened by the director of the Central Astrophysics Institute, Prof Dr (Kh.) Ju. Treder, were: 1966 Nobel physics prize winner Prof A. Kastler (France) with a paper on "Luminescence of the Night Sky"; Prof Van de Kamp (Holland) with a paper on "Planetary and Small Satellites of Stars"; Prof Dr W. Fricke, director of the Astronomical Computer Institute in Heidelberg, with a paper on "History and Significance of

the Science of the Berlin Observatory"; the world-famous architect with whose name the new center in Berlin is associated, (Kh. Khenzelman), with a paper on "The History of the Building of the Observatory as an Example of the Cooperation of Science and Architecture" et al. For Bulgaria, a welcoming address was given on behalf of the Bulgarian Academy of Sciences and a paper delivered by Senior Science Associate Dr B. Kobachev on the topic, "Joint Scientific Research of the GDR and Bulgarian Academies of Sciences." For their great services in equipping the NAO (National Astronomical Observatory) with a third Schmidt-system 50-cm-diameter telescope, moved from Potsdam, and for training personnel for it, the order of "the Gold Badge of the Bulgarian Academy of Sciences" was conferred in the name of the Presidium of the Bulgarian Academy of Sciences upon Prof Dr (Kh.) Ju. Treder, Prof G. Ruben and Engr (Kh.) Ju. Hubrig. Honorary diplomas were also presented to the specialists from the institute's workshop who participated in the installation of the 50/70-cm telescope at Rozhen.

The last day of the anniversary session concluded with a meeting with Academician P. Thyssen in Berlin. The world-famous 82-year-old scientist touched on interesting topics and voiced with alarm his anxiety over the United States' growing armament, leading to danger of a war of annihilation for all humanity.

The building of an observatory, modern for its time and of promise for the development of astronomy, in Berlin 150 years ago when impressive forward strides had been made in the development and design of astronomical instruments, was obviously an urgent necessity and is an event unquestionably worthy of commemoration. Its building was directed by J. Encke (1792-1865) beginning in 1825 and fulfilled by the architect Schinkel from 1832 to 1835. An important participant in the conception of the edifice and its equipping was Al. von Humboldt, who by his famous lectures on space in 1827-1828 gave the principal impetus to the building of the observatory. To be its director, Fr. Bessel suggested J. Encke--a student of Gauss's, who was already famous for his discovery in 1761 of the comet that received his name and for his determination of the sun's parallax from the passage of the planet Venus in front of its disk.

The principal instrument of the observatory was the 9-inch Fraunhofer refractor, for its time a supreme achievement, which, moreover, was the last work of this remarkable master. In 1846 the planet Neptune was discovered by J. Galle with the telescope. This was made possible on the basis of the calculations of U. Le Verrier, who predicted its existence and determined its position in the night sky at this time. The fact that U. Le Verrier "saw" Neptune first at "the tip of his pencil," to be sure, does not lessen the merit of J. Galle, who, in addition to U. Le Verrier's announcement, used for his success the precise star-maps prepared at the observatory. We can mention as a most significant achievement of the observatory the movement of the earth's poles established by Kuestner in 1888, which the renowned L. Euler had predicted 100 years before.

The present heir of the Berlin observatory--the Central Astrophysics Institute of the German Academy of Sciences, established in 1969, has assumed the great traditions of astronomical research contained in the history of the Astronomical Observatory in Berlin and in Potsdam-Babelsberg respectively,



and of the Astrophysical Observatory in Potsdam (Telegrafenberg). Today it includes also the observatory in Sonneberg and the German Democratic Republic's greatest contribution to astronomy--the observatory with a 2-meter telescope in Tautenburg.

Our associations with the Central Astrophysics Institute date from far back. The institute has rendered us significant assistance, as has already been pointed out above, in equipping the NAO with a third telescope (50/70-cm Schmidt camera) and in training some of the personnel needed to operate it. Thanks to the experience transferred from the GDR, an astral electrophotometer (created in our country) came into operation at the NAO in 1981 that has significantly expanded our observational capabilities.

In conclusion, we should like to note that on the basis of multilateral and bilateral scientific cooperation between the Central Astrophysics Institute of the GDR Academy of Sciences and the Independent Astronomy Section and the National Astronomical Observatory (NAO) of the Bulgarian Academy of Sciences, fruitful activity in the area of modern optical astrophysics has developed and grown stronger in recent years.

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CSO: 2202/3

SCIENTIFIC-TECHNICAL ACHIEVEMENTS OUTLINED

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 12, 1982 pp 2-4

[Article by Engr Toncho Tonchev: "Demonstration of the Scientific and Technical Progress of the Bulgarian People's Republic"]

[Text] A sense of pride grips every Bulgarian who has visited the 38th International Fair in Plovdiv. And those who have become familiar with the exhibits on display in the pavilions of the Ministry of Machine Building and Electronics see with satisfaction how in practice the mandate of the 12th BCP Congress to build the material and technical base of mature socialism is being implemented. The exhibits on display attest to the full automation, electronization, robotization and cybernetization of social production--the basis for achievement of the general intensification of our economy, the growth of efficiency and the wider and wider intellectualization of labor. Some of the exhibits on display indicate the number of workers that they are replacing in heavy and uncongenial labor.

It is characteristic of the autumn fair this year that almost no individual products, instruments and devices are shown, but rather whole integrated systems and centers for the control of technological and production processes. By their technical parameters and economic indicators they guarantee the securing of a high degree of organization of production processes in machine building, the chemical industry, power supply, communications, engineering work, managerial activity etc. The wide range of applicability of information-collecting and processing systems and the solution of complex scientific-and-technical and economic problems, including the automation of processes in a given scientific area, are graphically demonstrated.

On display are various POK's [programno orientirani kompleksi; program oriented complexes], which solve complex technological and production problems on the basis of modern microprocessor techniques and in some instances successfully replace the human intellect.

There are a record number of electronics products and computer equipment receiving gold medals at the present international fair, namely:

--ES 9005 multipanel data preparation system, developed at the TsIIT [Central Computer Equipment Institute] and produced at the Electronics Plant in Sofia.

It is a powerful specialized microcomputer system and is designed for the inputting, checking and primary processing of information data.

--Program 1024 is a microprocessor multistation system of noncontinuous and continuous production-process control. It was developed at the Instrument-Making Institute in Sofia and is produced by the Instrument-Making Plant in the city of Pravets. The programmability of the system permits its adoption for the control of various plants in a very short space of time, and its modular character ensures flexibility and enables the user to supplement and expand it in accordance with the needs that arise in the process of operations. The possibility of decentralizing it permits siting of the automata to be programmed in close proximity to the controlled plants. The system is monitored from the operator's panel.

--"Microsyst"--a decentralized system of continuous technological-process control, developed by TsNIKA [expansion unknown; possibly Tsentralen nauchno-izsledovatel'ski institut po kompleksna avtomatizatsiya--Central Scientific Research Institute for Full Automation], Sofia.

--IZOT-1011 and IZOT-1012 S technological complex for functional checking and diagnosis of digital-to-analog printed circuits, developed and produced at the Printed Circuits Plant in Ruse.

--PPK [Psikhofiziologichen kompleks; psychophysiological complex], developed at the Medical Equipment Institute in Sofia and produced at the Medical Equipment Plant in Vratsa. It gives an objective evaluation of the state of the central nervous system. It is designed on the basis of a minicomputer which automates the entire complex (display, acceptance, registration, measurement, processing, evaluation and printout of the protocol).

--ES 9114 Device for data preparation on flexible magnetic disk, developed and produced at the TsIIT in Sofia and OZZU [Okruzhen zavod za zapomnyashti ustroystva; Okrug storage plant] in Plovdiv.

--A system of centralized radiotelephone communication with selective calling and communication with ATTs [dial telephone exchange], developed at the Special Electronic Institute in Sofia and produced at the M. Antonov Plant in Gotse Delchev.

--SM-5306 (IZOT-5007 S) Magnetic tape storage, developed at the TsIIT in Sofia and produced at the ZZU [zavod za zapomnyashti ustroystva; storage plant] in Plovdiv.

--LAR001 Triphase electronic electric meter, developed at the Instrument-Making Institute in Sofia and produced at the Instrument-Making Plant in the city of Pravets.

--A POK for operational control of discrete production processes--DISPRO [Discrete Production] POK, developed at TsNIKA.

--ERM [Elektronen regulator na moshtnost; Electronic power regulator]-100/200, developed at the BNV [expansion unknown] for Lighting Equipment and produced at the Lighting Fixtures Plant in St. Zagora. It serves to regulate the luminous flux or, as the case may be, the electric power of sodium and mercury street lights in accordance with a preset hard program.

--IZOTON microprocessor system for direct potentiometric measurements, developed at the Central Automation Laboratory.

--BETATEST digital instruments for measuring partial pressure and traces of oxygen in gases, developed at the Scientific Instrument-Making NPP [Scientific Industrial Trust] in Plovdiv.

In addition to these, a number of other products and systems are on display that help form a fuller idea of the increased technical capabilities of our specialists and production workers.

The ES-1035 21 electronic computer system, which incorporates new hardware, raises speed and efficiency. With its great memory, diverse configuration and abundant functional capabilities, it permits the processing of a wide range of scientific-and-technical, economic and information-logic problems. On display are a number of magnetic disk storages--the mini-ZUMD [zapametyavaqo ustroystvo na magniten disk; magnetic disk storage] SM 5410 and the mini-ZUMD 5412, magnetic tape storages etc.

An interesting novelty is the Pravets-82 personal microcomputer, designed for individual use in education and instruction, science and technology, administrative and managerial activity, information etc.

Worthy of attention are a number of systems and program oriented complexes such as the IZOT-1008S "Gasoline" POK, the microcomputer system in the KAMAK [expansion unknown] standard, the "System 5" system for numerical program control of metalworking machines, the microprocessor system for the monitoring and control of decentralized hydraulic plants, the microprocessor system for measuring the discharge of water into open land-reclamation, transportation and other canals, the IZOT-1005S "DSK" [State Savings Bank] POK, the IZOT-1015S "Trade" POK, the microprocessor system for the automation of laboratory experiments, the system for microclimate control in hothouses, the IZOT-1003S microprocessor system for the processing of economic information etc.

The Elka 65 and Elka 67 electronic calculators, the Elka 92 and Elka 98 electronic cash registers and the Khebros 305 typewriters are the latest examples of office machinery, typewriters and cash registers.

Electronic and communications equipment is represented by a private branch exchange system with microprocessor control M400 and by an integrated system of long-distance communications which includes a PBX dial telephone exchange of the Crosspoint type (under license from the Siemens Company of the FRG), a multiplex telephone system, radio relay station, AM-2 IMEFON automatic dial etc.

An integrated system of centralized farm communications, consisting of an ATSK-50/200-M dial telephone exchange, KDSR control panel and modified TKMV 2/8 telephone set; the USAK, KEDR, SAKS and USKS systems for monitoring and controlling agricultural machinery; and the SAV [sistema za avtomatichno vodene; automatic driving system]-3 are bringing our agriculture up to the level of the most advanced countries in this regard.

The stands on which the structural elements of the electronic and electrical products are arranged are impressive with their new resistors, capacitors, optrons, MOS integrated circuits, microprocessor circuits, quartz and selenium instruments, dial and digital measuring instruments and apparatuses etc.

On display are a number of systems for the automation of managerial activity such as the IZOT-1016S microcomputer general-purpose computer system; the IZOT-1003S warehousing system; word processors IZOT-1002S, IZOT-1004S (for information) and table model IZOT-1020S for the inputting, editing, printout and storage of textual documents etc.

The machine-building and electronics products on display at the 38th International Fair in Plovdiv demonstrate the scientific and technical progress of the Bulgarian People's Republic and indicate that the party's decisions to provide for the reequipping of the material and technical base of the sectors of the national economy with automated high-efficiency machinery are being implemented during the Eighth Five-Year Plan.

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## APPLICATION OF VITAMIN C IN LIVESTOCK PRODUCTION

Prague NAS CHOV in Czech No 12, Dec 82 pp 515-516

[Article by MV Dr Jan Caslavka, Institute for Research of Biofactors and Veterinary Drugs, Pohori--Chotoun: "The Importance of Vitamin C and Its Use in Livestock Breeding"]

[Text] Vitamin C, chemically l-ascorbic acid, has a special position among other vitamins based on its vast use in the prevention and curing of most varied diseases. This is due to its significant function in body metabolism.

### The Effect of Vitamin C on Organism

Vitamin C is a strongly reductive substance. It is able to take away oxygen from other substances, oxidizing itself to dehydroascorbic acid in the process. This reaction is reversible, so that the reduction to ascorbic acid can again take place. In this way vitamin C acts either as an oxidant or a reducing agent, as needed. This makes possible its application in tissue breathing, where it takes part in many oxidative processes. Vitamin C is important for hormone synthesis, and one of its other functions is the activation of various enzymes. Next, it supports resorption of iron from the small intestine, influencing thus the level of hemoglobin. The relation of vitamin C to the metabolism of calcium and phosphorus is significant, too. Due to its antioxidative effect, vitamin C is capable of mitigating the lack of vitamins A, E, B<sub>1</sub>, B<sub>2</sub> and B<sub>12</sub>. Very significant is the role of vitamin C in reproduction, regarding the egg and sperm formation.

### Vitamin C and Resistance Against Infections

The mentioned physiological processes, which cannot take place without the presence of vitamin C, demonstrate that the importance of this vitamin in the organism is multifaceted. However, the influence of vitamin C on raising the resistance against infections is worthy of special attention. The higher resistance results from an increased production of gammaglobulins and phagocytic ability of leukocytes. At the onset of an infectious disorder, especially one with fever, there is an up to 10-fold increase in vitamin C consumption. Vitamin C has a neutralizing effect against some bacterial toxins. Human medicine utilizes the favorable effect of higher vitamin C doses in some viral disorders, such as influenza; there is an analogical situation in viral disorders of respiratory system in animals. Nevertheless, from the aspect of vitamin C it is important that an organism receive a sufficient amount of vitamin C even before a possible ailment sets in.

## Vitamin C and Stress

A higher demand for vitamin C occurs under stress conditions, e.g., when staying in a hot environment during the summer time, or in winter, when the productivity of animals exposed to long-term cold spells decreases. And it is vitamin C in higher doses which prevents the occurrence of stress situations, or mitigates them.

## Need for an Increased Dose of Vitamin C

As regards the complementing of an animal organism with vitamin C, next to its portion in fodder it is necessary to increase its external supply in two cases, that is:

--In case there is a low level of vitamin C in fodder. This condition occurs when the fodder given to animals has a low content of vitamin C, i.e., when feeding wilted plant fodder, or when skipping the vitamin C supplement in the feeding portion altogether. In young animals, the decreased intake of vitamin C from their mothers' colostrum takes place when the mothers were not fed sufficient fodder containing vitamin C, or when the young ones are fed milk substitute without vitamin C supplement. One should be aware of the fact that in the production of milk substitutes vitamin C is depreciated due to the drying of milk at higher temperatures.

--When an organism is subjected to physiological overload, e.g., at the peak of egg laying; under the influence of exceedingly increased atmospheric temperature; in case of a reduced resistance of animals kept in cold and damp environment with a possibility of infection transfer, etc.

In practice it is mostly necessary to increase the supply of vitamin C due to both of the mentioned reasons. This need occurs when there is a discrepancy between an insufficient supply of vitamin C or its low generation, and an increased demand for this vitamin in an organism.

## Vitamin C Need in Individual Animal Species

Based on the most recent biochemical findings and results of clinical research on the need of vitamin C in both humans and various animal species, there were revealed new discoveries of paramount importance in recent years. It is known that some animals are unable to generate ascorbic acid, although it is a substance chemically very simple. Of equal importance, however, is also the fact that in most kinds of livestock, including even herbivores, their internal supply of vitamin C by autosynthesis is insufficient due to the influence of present ways of feeding and breeding. This applies especially to young animals, i.e., calves, piglets and chicks, where ascorbic acid is applied perorally. The following can be used as sources of vitamin C: 25 percent powdered Celaskon, a veterinary preparation in 250 g to 5 kg containers, which is available in pharmacies; or a vitamin C mixture which is produced and sold in 10 kg containers under the name VS-C, and is available in agricultural purchasing enterprises.

## Dosage

Another often discussed question is that of the ascorbic acid dosage. Nobel Prize winner L. Pauling was the first to deal with administering high doses to humans in his works. In today's opinion, high doses of vitamin C have positive effects, especially at the beginning of acute respiratory infections, or in cases of organisms subjected to stress.

External supply of vitamin C to livestock is of importance mainly in calves, starting from their birth up to 4-6 weeks of age, i.e., above all in the period of lactation. The lack of vitamin C results in a decreased natural resistance, and in frequent occurrence of respiratory system disorders. In the first two weeks of their lives, calves need 250 mg of ascorbic acid a day. This amount is not always covered by milk or colostrum. Usually a half of the vitamin C amount has to be supplied by applying ascorbic acid in the form of preparation Celaskon, 25 percent pulvis ad usum veterinarium. For a calf of 50 kg body weight, this amounts to 1 teaspoon of the preparation a day for 5 to 10 days. Doses three times higher are used when the animals are being transported, or if they have respiratory system disorders. In agricultural practice this usually happens when calves are being relocated to large-scale calf pens with a high concentration of animals, resulting in frequent ailments and increased deaths of calves due to pneumonia.

In case of hogs, it is necessary to administer ascorbic acid from birth till weaning, because piglets are very sensitive to an insufficient supply of vitamin C. That is why fodder mixtures for an early weaning of piglets have to be fortified with 100 - 200 mg of ascorbic acid per 1 kg of the mixture. This is important especially for preventing both anemic conditions and flu ailments in piglets. External supply of ascorbic acid to pregnant sows is given 14 to 21 days before parturition, and 3 to 4 weeks to lactating sows in doses of 20 mg of Celaskon per 1 kg of body weight, i.e., 2 g per 200 kg of a sow's body weight. Ascorbic acid favorably affects the parturition, lactating sows yield more milk, piglets have higher vitality after being born, and their weight increments increase. If the fodder mixture for sows has been medicated with Farmaferr or AAS -- Antianemic Blend -- it is necessary to add Celaskon separately, so that it not come in contact with iron.

Favorable effects of vitamin C can be seen above all in poultry, in the so-called cage fatigue of egg layers. As a rule, very good layers suffer from this ailment when they are kept in cages, and the regular preventive application of 25 percent powdered Celaskon can insure the standard high laying of eggs.

Positive effects of vitamin C external supply are displayed in a period of its increased demand, proving that this vitamin acts as a protective factor against the negative influences of high atmospheric temperatures on egg laying, and as a factor affecting shell quality by exerting a favorable influence on calcium resorption. It is recommended to add 50 mg of vitamin C to the feed mixture, i.e., 200 mg of 25 percent Celaskon ad usum veterinarium. Another practical indication in agriculture is the prevention of stress conditions after relocating the animals from the breeding to the egg-laying hall.



It is only natural that the effect of ascorbic acid application will be different in individual cases, being the highest where the lack of vitamin C is the greatest. Analogically, this will also apply to the evaluation of economic effects of employing preparations containing ascorbic acid. In general, the economic effect is high. This is proved by field results achieved after application of 25 percent powdered Celaskon to calves in the nutrition period. The application of 1 kg of the preparation worth Kcs 140 is often a boon due to a decreased occurrence of deaths and necessary slaughterings amounting to Kcs 4,000 to 5,000. With egg layers, the economic effect after investing Kcs 140 to 1 kg of the preparation is one-fourth lower, amounting "only" to Kcs 1,000. However, even here there is high restitution by preventing a decrease in egg laying due to reduced losses resulting from broken eggs and perished hens.

It is true that more and more attention is being paid to the problems of shortages in vitamin C fodder supplements. Nevertheless, due to the far-reaching importance of vitamin C for the production of healthy animals, it is necessary to devote even more care mainly to its sufficient amount in feeding portions in the winter period and at the beginning of spring time. This means basically feeding sufficient quantities of quality fodder with a high content of vitamin C, or supplementing vitamin C with preparations containing ascorbic acid when needed.

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CSO: 2402/25

## MERA-60 MICROCOMPUTER SYSTEM DESCRIBED

Warsaw POLISH TECHNICAL REVIEW in English No 4, Apr 82 pp 34-35

[Article by Andrzej Grzywak: "MERA-60 Microcomputer System"]

[Text]

*In 1979, the Scientific and Production Centre for Control Systems MERA-STER, Katowice, started production of the MERA-60 microcomputer system designed for process control, engineering computations and automating scientific research. This computer system has been developed in cooperation with the Soviet Union, utilizing LSI components made in the USSR and Poland. The MERA-60 system is equipped with Polish peripherals and interface systems.*

In industrial works, computer systems perform different tasks depending on the degree of technological process sophistication and production organization. As regards the scope of its application, the MERA-60 microcomputer system has been conceived for industrial and laboratory measuring systems, dispatcher's systems, and process control. In its simplest design version, the MERA-60 can be also used for engineering computations and software development. It is also possible to set up hierarchical configurations based on the MERA-60 and/or large minicomputer systems. Several MERA-60 units can be hooked up to operate in time sharing networks and, therefore, the MERA-60 can be also used for managing industrial plants or technological processes. In order to perform these tasks the MERA-60 system has been developed in three design versions, and can be set up from different modules.

### General characteristics of the MERA-60

MERA-60 constitutes a modular-design microcomputer system in which MSI or LSI semiconductor technologies have

been employed. A standard computing centre comprising 16 data transmission and address lines and 23 control lines is the main element of the system.

Central processor, memory units (each with 4 K 16 bit words – RAM and EPROM), standard system modules for a given configuration, besides special modules designed to meet particular requirements of users (Fig. 1) are attached to the computing centre.

At the moment, only one piece of equipment determines the access of a given module to the centre – generally, it is either a processor or a special module provided with direct memory access units.

The processing of interruptions, produced by various events in the system, can occur in either of the two ways:

- programme processing done basing on the programme controlled testing of the status register of a given module,
- equipment servicing by testing the logical state of specific control lines of the computing centre after executing the successive instruction of the programme being currently realized.

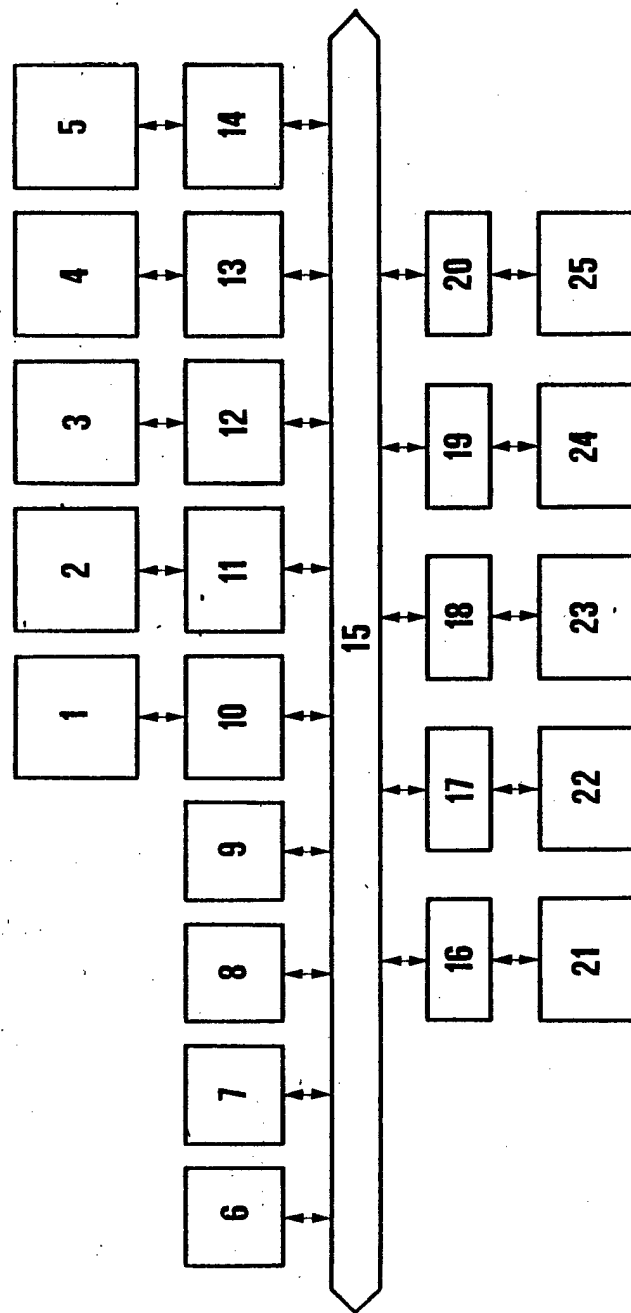


Fig. 1. Architecture of the MERA-60 system: 1 - PK1 type cassette memory, 2 - SP 55DE disk, 3 - DZM dot matrix printer, 4 - type SPTP-3 paper tape station, 5 - type 7952 monitor screen, 6 - processor, 7 - 4K RAM memory, 8 - EPROM memory, 9 - programmable clock, 10 - cassette memory controller, 11 - floppy disk memory controller, 12 - in-series interface, 13 - parallel interface, 14 - in-series interface, 15 - MERA-60 centre, 16 - V-24 interface, 17 - IEC interface, 18 - CAMAC interface, 19 - digital input/output, 20 - analogue input/output, 21 - data transmission, 22 - measuring equipment, 23 - CAMAC system, 24 - digital input/output from controlled object, 25 - analogue input/output from controlled object

During the equipment servicing of interruptions, the so-called vectorized interruption system, enabling the immediate identification of the interruption source (time lag 2...35  $\mu$ s) and starting the programme interruption servicing routine, is used.

There are three ways of programming the system:

- in machine's internal code from operator's console (screen monitor type MERA-7952 or a keyboard equipped printer type DZM-180 KSR),
- in the ASSEMBLER symbolic language using the EDITOR and LINKER processors,
- in the higher programming languages FORTRAN IV, BASIC.

The equipment used in the system centre makes possible the automatic recording or reading of output addresses when executing sub-routine jumps and returns from sub-routines, and also allows automatic recording of the current content of the instructions counter and of the processor status register, which is then followed by printing the interruption vector to the instructions counter as well as the processor status register. Besides interruptions inherent in the central system, there can also occur programme interruptions produced by special instructions.

The MERA-60 system makes use of three types of instructions: zero-address, single-address and double-address instructions. The instruction code contains only the operation code in the zero-address instructions. The single and double instructions generally comprise information specifying: the performed function, general purpose registers used when taking operands, and the way of addressing. The MERA-60 system processor utilizes 8 general designation registers which may be made use of as: accumulators, address registers, and also those whose content changes automatically, and index registers. Any selected general purpose register may be used as system index.

The list of instructions of the MERA-60 microcomputer is compatible with the instructions list of the PDP-11/V03 of the firm of DEC. The MERA-60 system architecture is based on a central unit to which individual system modules are hooked up.

System modules can be divided into four groups:

- standard microcomputer modules (processor, RAM and ROM memories),
- standard modules of peripherals,
- standard interface systems with controlled object,
- non-standard modules adopted for special requirements of users.

The maximum number of modules that can be hooked up is 17. The MERA-60 system comes in the following versions: MERA-60/10 (basic version), MERA-60/15 and MERA-60/30.

#### **NERA-60/10**

Disk-less version that can be hooked up to standard and special modules. MERA-60/10 is available only in the desk top version (for computations) or in cabinet version with peripherals detached.

#### **NERA-60/15**

The disk version of the MERA-60 system involves the hooking up of a floppy disk-type memory system, the RT-60 operating system supervising the operation of the microcomputer. It is also possible to utilize one- and two-task operating system.

#### **NERA-60/30**

The MERA-60/30 version is the further functional extension of the floppy disk version. In the MERA-60/30, the microcomputer, its peripherals and a CAMAC system cassette have been integrated. It is provided with a housing resistant to all hazards of industrial applications.

#### **Applications of the MERA-60 system**

These systems are used mainly for automating measurements (research labora-

tories, industrial measuring systems) and for technological process control. An interesting example of the application of the MERA-60 system is provided by the system automating the process of flotation of zinc and lead ores. That system has been implemented at the Mining and Metallurgical Combine at Boleslaw to make possible the real time determination of the content of such elements as zinc, lead, copper and iron, besides controlling the flotation process in such a way as to reduce the losses of these elements in the post-flotation wastes. Application of the MERA-60 in different conditions has confirmed fully its excellent technical and general reliability qualities.

Average inter-breakdown times of the order of 5,000 hours attained in industrial applications rank the MERA-60 system as good on a world scale.

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## ROMANIA

### PAST, PROSPECTIVE TECHNICAL DEVELOPMENTS IN PETROLEUM AREA

Bucharest MINE, PETROL SI GAZE in Romanian No 10, Oct 82 pp 445-450

[Excerpts from unsigned article]

[Text] The tremendous development of scientific research in the years of socialist construction and, especially, during the last 17 years, has resulted in the discovery of many deposits, in the increase in production, in raising of the final recovery rate and in the continuous upgrading of oilwell drilling and operation technology. For instance, noteworthy are the doubling of output during the 1950-1955 period and the extraction in the last 25 years of a quantity of crude which is greater than that extracted in the first 100 years of operation of the oil mining industry. Outstandingly expanding was the natural gas production which in 25 years has grown more than tenfold.

The party leadership's concern for the expansion of the petroleum and gas industry also is forcefully reflected in the large investment funds assigned to this industry. These funds were earmarked for the upgrading of prospecting technique and procedures, geological and geophysical surveying, drilling and mining technology, increasing the final recovery rate of petroleum from the deposit.

Like in other countries, seismic prospecting has proved to be the most effective geophysical prospecting method for hydrocarbons and has been regularly used in all geological units. Its evolution involves three stages, corresponding to technological development.

In the first stage, 1948-1960, use was made of oscillographic seismic stations and the field technology involved singular central sources and singular receiver. The data obtained helped to decipher the chief structural alignments and identify the major structures in areas with simple seismological conditions,

During the 1961-1970 period, seismic projects expanded and involved use of analogic seismic stations with magnetic recording and more advanced field technology, multiple central sources and multiple receivers. The data processed at a higher level resulted in greater resolving power of the seismic method and facilitated the clarification of the detail structure of many perspective zones.

Early 1972 saw the switch to a new stage, characterized by the introduction of the numerical technique of data recording and processing and the upgrading of the field operation techniques. The results permitted the improvement of information quality.

Geological research drilling (prospecting and exploration) has been continuously developing, as a result of progressive extension in surface and depth of the country's territory covered by sedimentation.

In the past 20 years in the Romanian petroleum industry the idea has begun to assert itself that petroleum geological formations which are productive at shallow levels can also be productive at deep levels and that geological surveying of surfaces, where formations go down deeply, is absolutely necessary. In this country the first deep wells were designed and began drilling during the 1961-1963 period. These wells were designed to help form an orientational assessment on petroleum prospects and a geological work concept in the orientation of prospective research. These initial goals have been partly achieved, permitting the progress of research on formations located deeper than 4,000 m and this undertaking resulted in the discovery of new deposits.

Intensive geological surveying has resulted in a sharp increase in crude and gas geological reserves, an increase which has allowed for higher output. The 12th RCP Congress allotted paramount tasks to geological hydrocarbon surveying and consequently geological activity has been channelled along the following major directions:

- a. Scientific research focused on resolving the main problems pertaining to orientation and substantiation of prospecting and exploration projects and also the upgrading of the methods for superior utilization of information obtained as a result of geophysical prospecting and oil well geophysics.
- b. Stepping up seismic prospecting with upgraded procedures and up-to-date equipment, to obtain conclusive information on the structure of formations with complicated geological conditions and of deep formations.
- c. Development of complex research for identification and localization of stratigraphic and lithologic traps, specifically in the area of old sites, where the fund of structural traps was practically exhausted.

Special attention was paid to upgrading drilling technology, with the focus on resolving the specific problems of geologophysical conditions in oil- and gas-bearing areas in Romania. The median depth of oil drilled exceeded 1,700 m and the input of deep oil drilling (over 4,000 m) went up. Moreover, emphasis was placed on drilling wells for compaction, replacement and spacing addition.

The progress made in well drilling in the last 5-10 years was generated by the new Romanian-made facilities, installations and materials characteristic of oil well drilling and the technical advances made in drilling technology proper.

The development and diversification of the experimental laboratory base with respect to the drillable nature of rocks, the studies conducted in the area of mechanics of rocks, the rise in the volume and strictness of technological research, by drilling pilot wells, permitted to estimate the effect of modification of technological parameters on the work speed and cost in drilling. This made it possible to use computers for the analysis and synthesis of optimal technological approaches, for the overall optimization of the flow in a drilling well.

The investigation of the interaction between drilling fluid and argillaceous rocks, the new techniques for determining the pressure and fracturing gradients, for monitoring the path of the drill hole have opened up new technological prospects for preventing complications in drilling. The upgrading of drilling technology focused on increasing the drilling speeds and cutting the cost of one drilled meter.

An essential direction of technical progress in drilling involved increased power transmitted to the bit (bit weight, rotation, hydraulic power) in the context of optimal correlation of the rate parameters, to cut costs in the drilling stage.

In zones characterized by a natural tendency of intense deflection used are heavy drill pipe strings, that are rigidified for obtaining a liberalized course, with optimal bit weights, thereby increasing the work rate.

There has been an improvement in the programming of the drilling technology, which required the upgrading of designing in drilling and the upgrading of the vocational training of the operatives.

In the future also, based on the Directives of the 12th Congress, it is expected that the diversification of drilling equipment, materials and installations will coincide with the upgrading of the technology of rotary drilling, especially tied to greater drilling depth. This will primarily necessitate the more accurate forecasting of the geological-physical conditions prior to drilling a well and the quantitative definition of these conditions, for the purpose of programming the optimal drilling technology that assures maximal speeds and prevention of complications.

In the area of extraction technology efforts have been made to upgrade the gas-lift, deep pumping, treatment of fluids produced on the field and the methods for combating sand, paraffin, corrosion and crusts.

In the last 15 years, the bottom-hole and surface equipment of wells operated by gas-lift was modernized. Being used now for about 10% of the number of wells are cycle starting valves, drilling valves, packers and devices. The use of this outfit has been instrumental in boosting the output per well and in reducing the lifting ratio, as a result of the increased lifting depth and the possibilities for monitoring the gas injection.

The upgrading of deep pumping involved improving the mechanical performance of the surface and depth equipment, the improvement in the design of the facilities and materials used, the application of the results of research on the optimal operation of the equipment and utilization of the deposit characteristics in designing and analysis of the performances of the pumping system. Hence, in the pumping units, extraction pumps diversified for the various drilling areas were built, abrasion and corrosion resistant materials were used and pumping drill pipes for corrosive media and great pumping loads were turned out.

The limits of deep drill pipe pumping required the use of electric sinking pumps, which proved to be effective in extraction of high outputs from the wells affected by water injection and, consequently, the need for extending their utilization.



For the purpose of continuously improving the deep pumping system efforts will be made to upgrade materials, pump building, the features of the equipment, extraction technology, diversification of pump rods, partial arrangement for the production of outfit needed for sinking rotary pumps, designing, production and utilization of hydraulic pumping based on the proposals for inventions existing in this field and jet pumping.

In the aftermath of research conducted, ethoxylated block copolymer nonionic surfactants, of great effectiveness, were synthesized and are being turned out in amounts that meet the needs of the extractive industry.

The dehydration of gas and gasoline is based on unmoving bed adsorption, using Romanian made silica gels and molecular sieves. Gas dehydration based on glycol adsorption is being tested industrially.

The recovery of liquid hydrocarbons from gases is based on unique procedures that use highly efficient native active coals. For the provision of the raw material required by the petrochemical industry facilities were opened for the recovery of ethane from gases, by cryogenic processes.

Current and future economic needs call for superior utilization of the hydrocarbons extracted, simultaneously with reduction in relative energy consumption and avoidance of environmental pollution. In this context, the problems that ought to be resolved in the future are the following:

- a. Closure of the petroleum collection and treatment systems in old oilfields, for the purpose of reducing volatile hydrocarbon loss;
- b. Improvement of the current heating systems, recovery of residual heat and utilization of geothermal energy in petroleum treatment;
- c. Development of processes which ensure elimination and utilization of  $\text{CO}_2$  and  $\text{H}_2\text{S}$  from natural gases;
- d. Development of processes for treatment of the petroleum extracted by thermal procedures;
- e. Development of processes and installations for extraction of petroleum from oil residues or for their incineration and for recovery of waste drilling fluids.

We emphasize that the filters used have always provided an area where improvements must be made in terms of simplifying their design, reducing the diameter of the clearance hole and ensuring most complete sand retention. The filters with converging rings, shaped filters and filters with knurled rings gave the best results.

In most cases, combating of paraffin deposits is based on mechanical and thermal methods. The industrial tests conducted by continuous or discontinuous injection of surfactants and polymers indicated that paraffin deposits decline 50% and this significantly reduces the frequency and costs of paraffin removal operations.

Industrial synthesizing of some highly-efficient corrosion inhibitors has significantly reduced extraction equipment corrosion. For instance, inhibitors ACOR 21, ACOR 22 and ACORAMID 42 have been very effective in treating wells and also in acidizations conducted at temperatures up to 150°C.

Recent years have seen the ever broader prevention of crust formation by treatment with sodium hexametaphosphate and tripolyphosphate, with controlled dissolution, and with hydrochloric acid.

Expansion of future activity requires the synthesizing of some chemical products with greater efficiency to prevent the formation of tridimensional lattices of paraffin crystals, of more effective corrosion inhibitors for deep wells and crust inhibitors with controlled solubility.

Romanian petroleum experts have been constantly concerned with maximizing the final recovery factor in petroleum deposits. For instance, initiated and expanded was exploitation of petroleum deposits by water or gas injection. As a result, in about 20 years a 10-11% annual average increase in Romania's overall petroleum output has been obtained.

For each petroleum ton extracted in excess about 15 cu m of water and 2500 N cu m of gas were injected into the deposit on average. This has resulted in the rise in the number of deposits with the final recovery factor around 60% and in ensuring a countrywide average final recovery factor of about 32%.

In light of the limited area of application of the water and gas injection methods and the relatively small rise in the average final recovery factor, the last decade in Romania saw the study and development of new methods of exploitation: thermal methods, miscible displacement of petroleum (injection of carbon dioxide, of micellar solutions or solvents) and the injection of water with polymers, regarded as secondary or tertiary methods, depending on the existing deposit conditions and the time of application.

Industrial testing, directly in the field, of thermal methods -- below ground combustion and steam injection -- has demonstrated their effectiveness and the need for extending the use of combustion also to deposits with less viscous oils, plus the fact that cyclical steam injection, under certain conditions, results not only in intensified extraction but also in greater recovery rate, because of the gravitational effect of flowing of heated oil.

As for the methods of miscible displacement of petroleum, notably: the injection of carbon dioxide and the injection of water with micellar solutions, plus the injection of water with polymers, laboratory studies have been conducted in this country and initiation of processes in the field are in progress.

As a result of implementation of the party directives on the intensive development of the methods for maximizing recovery, which underlay the formulation of a national program for increasing the final recovery factor, the number of deposits where these methods are being applied has been constantly rising. As a result of the application of these methods, it is anticipated that the number of deposits with final recovery factors up to 60-70% will go up and this will ensure an average

countriwide final recovery factor at levels which are similar to those anticipated on a world scale.

Tradition and, especially, the impressive accomplishments of our petroleum industry have permitted socialist Romania to assert itself as an active and appreciated factor internationally in resolving technical-scientific problems of petroleum drilling and extraction.

The Socialist Republic of Romania cooperates with CEMA members within the framework of the Permanent Commission for Cooperation in the Petroleum and Gas Industry and participates in a number of cooperation conventions in this field. This bi- or multi-lateral cooperation focuses on technical-scientific matters and also on aspects of drilling activity proper.

In cooperation with all the CEMA countries efforts have been made to upgrade the machines and installations, the tools and outfit for drilling. Experts worked out lists of installations, detailed technical requirements involved, which underlay the streamlining and specialization in oilfield equipment production among countries. Very effective has been multilateral cooperation focusing on concretely defined matters, such as: combating of free flows, including the technique and technology for capping free flow wells, development of the technique and technology for drilling deep wells on structures with a high content of  $H_2S$  and  $CO_2$ , inclusively in the presence of abnormally high pressures, reduction of consumption rates for energy and materials in drilling activity, and so forth.

Cooperation in the area of upgrading oil deposit exploitation has involved:

- a. Mutual visits of groups of experts for technical-scientific documentation on matters pertaining to improvement of oil deposit exploitation and testing and extension of the use of new methods for maximizing the final recovery factor in these deposits;
- b. Mutual and periodical exchange of information about the studies conducted for the purpose of upgrading conventional methods of water and gas injection and testing of new methods (thermal, chemical and petromining methods);
- c. Participation in all the CEMA meetings on the matters involved and in some symposia organized in CEMA countries on upgrading of oil deposit exploitation.

Working to expand cooperation in conducting scientific, theoretical and experimental surveys, Bulgaria, Hungary, East Germany, Poland, USSR, Czechoslovakia and Romania concluded the convention on creating the joint laboratory for drilling fluids and slurry, which, beginning in 1980, has been operating under the Cimpina Research and Design Institute for Petroleum and Gas.

This technical-scientific cooperation with CEMA countries, which is effective by the results obtained, will continue in the future.

The reputation of Romanian petroleum experts, the superior quality of our oilfield equipment, and the experience in this field promote Romania as an ideal partner for cooperation in all the areas of the petroleum and gas mining industry. In the spirit of true cooperation, Romania, through ROMPETROL company, has applied and continues

to apply for foreign partners, through its material and human resources, the Romanian experience of all the petroleum and gas mining industry, in the form of the following activities: seismic prospecting and complex geological and geophysical surveying; drilling, exploitation, maintenance and capital repairs of petroleum, gas and water wells; completion of complex "turn-key" projects -- pipes and storage units for transportation and storage of petroleum, natural gas and petroleum products; provision of technical assistance in all the areas of the petroleum and gas mining industry, through highly-qualified experts and consultants, and training of personnel for cooperative partners.

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